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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Shmuel Levy

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EXAMINER

NGUYEN, LEON VIET Q

ART UNIT

PAPER NUMBER

2611

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/822,829	Applicant(s) LEVY, SHMUEL	
	Examiner LEON-VIET Q. NGUYEN	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 March 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,6,7,9,10,13,15,19,20,22 and 24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,6,7,9,10,13,15,19,20,22 and 24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>5/20/09</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to communication filed on 3/9/09. Claims 11, 28-30 and 32 have been cancelled. Claims 1-3, 6, 7, 9, 10, 13, 15, 19, 20, 22 and 24 are pending on this application.

Response to Arguments

2. Applicant's arguments with respect to claim 1-3, 6, 7, 9, 10, 13, 15, 19, 20, 22 and 24 have been considered but are moot in view of the new ground(s) of rejection.

Claim Objections

3. Claim 3 objected to because of the following informalities:

- a. Claim 3 should read "coding the data stream generated *by* said multiple-in multiple-out receivers-transmitters system in a diversity mode".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 3, 9, and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites coding a data stream in *either* a diversity or multiplexing mode. However in claim 3 it appears that the same data stream is coded in both a diversity and a multiplexing mode.

Claims 9 and 19 recite the limitation "received with said received channel state information". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-3 and 5-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greenstein et al (US6131016) in view of Walton et al (US20060193268) and further in view of the background of applicant's specification (hereby referred to as the background).

Re claim 1, Greenstein teaches a method of transmitting in a multiple-input-multiple-output (MIMO) transmitters receivers system, comprising:

adaptively selecting a coding mode (col. 4 line 63 – col. 5 line 1) of each orthogonal frequency division multiplexing sub-carrier symbol of a data stream (col. 3 lines 59-63) according to a feedback data packet having a coding information of the OFDM subcarrier symbol (col. 4 lines 1-5).

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grouping subcarriers symbols coded according to the multiplexing mode in a first group;

grouping subcarrier symbols coded according to the diversity mode in a second group; and

transmitting the subcarrier symbols of the first group by a first antenna and the subcarrier symbols of the second group by a second antenna.

Greenstein fails to teach where the coding mode is either in a diversity mode or in a multiplexing mode. However AAPA teaches where the first and second subcarriers symbols data streams are either in a diversity mode or in a multiplexing mode (§0002).

Therefore taking the combined teachings of Greenstein and AAPA as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the multiplexing MIMO system of AAPA into the method of Greenstein. The motivation to combine AAPA and Greenstein would be to prevent the entire transmitted symbol from being in error (§0003 of AAPA).

Greenstein also fails to teach grouping subcarriers symbols coded according to the multiplexing mode in a first group;

grouping subcarrier symbols coded according to the diversity mode in a second group; and

transmitting the subcarrier symbols of the first group by a first antenna and the subcarrier symbols of the second group by a second antenna.

However Walton teaches grouping subcarriers symbols coded according to the multiplexing mode in a first group (§0014, §0071. The one or more data streams are selected from various possible transmission modes including multiplexing mode. It would be obvious to label the data stream to be transmitted in multiplexing mode as a first group);

grouping subcarrier symbols coded according to the diversity mode (§0138) in a second group (§0014, §0139. It would be obvious to label the data stream to be transmitted in multiplexing mode as a second group); and

transmitting the subcarrier symbols of the first group by a first antenna and the subcarrier symbols of the second group by a second antenna (§0041, §0059, §0064, diversity processor 320 in fig. 3 assigns transmit symbols in accordance with the selected transmission modes to the respective transmitters. Each transmitter processes a respective symbol stream).

Therefore taking the combined teachings of Greenstein and Walton a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the multiplexing MIMO system of Walton into the method of Greenstein. The motivation to combine Walton and Greenstein would be to achieve higher bit rates under certain favorable conditions (§0072 of Walton) and achieve higher reliability under certain data transmissions (§0073 of Walton)

Re claim 2, the modified invention of Greenstein teaches adaptively grouping receivers according to said coding grouping information (§0144 of Walton) received with said feedback data packet (§0052 of Walton) to at least a first receivers group and a second receivers group (it would be obvious to group the receivers according to the transmission mode);

decoding subcarrier symbols coded according to a multiplexing mode by the first receivers group with a multiplexing code decoding scheme (§0143 of Walton, decoding in a manner complementary to the coding at the transmitter); and

decoding subcarrier symbols coded according to a diversity mode by the second receivers group with a diversity code decoding scheme (§0143 of Walton, decoding in a manner complementary to the coding at the transmitter).

Re claim 3, the modified invention of Greenstein teaches a method comprising coding the data stream generated by a multiple-in multiple-out receivers-transmitters system in a diversity mode (§0002 of AAPA); and

coding the data stream generated by a multiple-in multiple-out receivers-transmitters system in a diversity mode (§0014 of Walton).

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Re claim 5, the modified invention of Greenstein teaches a method comprising:
transmitting symbols of the first and second sub-carriers symbols data streams coded in the multiplexing mode (¶0002 of AIPA) by a first transmitter (transmission circuit 202 in fig. 2A of Greenstein, col. 3 lines 5-6 and lines 59-62 of Greenstein); and
transmitting symbols of the first and second sub-carriers coded in the diversity mode (¶0002 of AIPA) by a second transmitter (transmission circuit 203 in fig. 2A of Greenstein, col. 3 lines 6-7 and lines 59-62 of Greenstein).

One of ordinary skill in the art would have found it obvious to use both the multiplexing and diversity system in a MIMO system such as the system taught by Walton.

Re claim 6, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 1. The coding symbols of a first and second subset in claim 6 are interpreted to be equivalent to grouping subcarrier symbols coded according to the multiplexing and diversity mode.

Re claim 7, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 2.

8. Claims 9, 13, 15, 19, 22 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (US20040132496) in view of Walton et al (US20060193268) and further in view of applicant's admitted prior art (hereby referred to as AAPA).

Re claim 9, Kim teaches a MIMO transmitters receivers system comprising:
first and second mappers (blocks 113 and 114 in fig. 1) to receive first and second encoded data streams (fig. 2, the demuxed output of channel encoder 2110) and to output first and second orthogonal frequency division multiplexing sub-carriers symbols streams (the output of blocks 113 and 114 in fig. 1, ¶0051. An OFDM signal is well known to have multiple sub-carriers. Since there are multiple sub-carriers, it would be obvious to at least have a first and second sub-carrier), respectively;

a coding mode selector (block 111 in fig. 1) to select a coding mode of a symbol of said first and second orthogonal frequency division multiplexing sub-carriers symbols streams (¶0047);and

a plurality of receivers (receiver 130 in fig. 1 has multiple antennas. Each antenna is interpreted correspond to a receiver) receiving signals received with a received channel state information (¶0055, ¶0058. It would be obvious to group the receivers in a single group if there is a single coding mode).

Kim fails to teach wherein the coding mode is selectable from either a diversity mode or a multiplexing mode. However AAPA teaches coding bits in a diversity MIMO system (¶0002) and suggests also coding at least some of the symbols in a multiplexing

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mode (§0003). This is interpreted as being two different coding modes. One of ordinary skill in the art would have found it obvious to be able to select one coding mode.

Therefore taking the combined teachings Kim with AAPA as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the diversity and multiplexing coding of AAPA into the apparatus of Kim. The motivation to combine AAPA and Kim would be to gain sensitivity by exploiting multi path propagation channel property (§0002 of AAPA) and to prevent an entire transmitted symbol from being in error (§0003 of AAPA).

Kim also fails to teach where the coding mode is selected according to a feedback data packet having coding information of the OFDM subcarrier symbol and a plurality of receivers to be adaptively grouped according to coding group information related to each one of the sub-carriers symbol streams and received with said received channel state information.

However Walton teaches where a coding mode is selected according to a feedback data packet having coding information of the OFDM subcarrier symbol (§0052) and a plurality of receivers (receivers 254a-254f in fig. 2) to be adaptively grouped according to coding group information related to each one of the sub-carriers symbol streams (§0144-§0145) and received with said received channel state information.

Re claim 13, the modified invention of Kim teaches a MIMO transmitters receivers system comprising:

a first transmitter to transmit sub carriers symbols of the first and second orthogonal frequency division multiplexing sub-carriers symbols streams (Ant 1 in fig. 1 of Kim) coded according to the diversity mode (¶0002 of AAPA); and

a second transmitter to transmit sub carriers symbols of the first and second orthogonal frequency division multiplexing sub-carriers symbols streams (Ant M in fig. 1 of Kim) coded according to the multiplexing mode (¶0003 of AAPA)

Re claim 15, the modified invention of Kim teaches an apparatus wherein the second transmitter is able to transmit at least some of the first and the second orthogonal frequency division multiplexing sub-carriers symbols streams that are coded according the diversity mode (¶0002 of AAPA) and at least some other coded symbols of the first and the second orthogonal frequency division multiplexing sub-carriers symbols streams are coded according to multiplexing mode (¶0003 of AAPA). One of ordinary skill in the art would have found it obvious to use a single transmitter to transmit the coded symbols.

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Re claim 19, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 9. Furthermore, dipole antennas are well known in the art.

Re claim 22, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 13.

Re claim 24, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 15.

9. Claims 10 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (US20040132496), Walton et al (US20060193268) and the background of applicant's specification (hereby referred to as AAPA) in view of Wu et al (US6985434).

Re claim 10, the modified invention of Kim fails to teach a MIMO transmitters receivers system further comprising:

a channel state analyzer to select the coding mode based on a quality indicator of the orthogonal frequency division multiplexing sub-carrier of the first and second orthogonal frequency division multiplexing sub-carriers symbols streams.

However Wu teaches a controller which selects either time diversity of spatial multiplexing encoding for two groups of sub-carriers (col. 5 lines 30-38), which is selected to satisfy quality of service (col. 5 lines 39-46).

Therefore taking the modified teachings of Kim, Walton and AAPA with Wu as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the encoding mode selection of Wu into the apparatus of Kim, Walton and AAPA. The motivation to combine Wu, Kim, Walton and AAPA would be to maximize the throughput gain (col. 5 lines 46-47 of Wu).

Re claim 20, all of the claim limitations as recited have been analyzed and addressed in the above rejections with respect to claim 10.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON-VIET Q. NGUYEN whose telephone number is (571)270-1185. The examiner can normally be reached on Monday-Friday, alternate Friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon-Viet Q Nguyen/
Examiner, Art Unit 2611

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Supervisory Patent Examiner, Art Unit 2611